



THE CITY OF SAN DIEGO

M E M O R A N D U M

DATE: January 10, 2011

TO: Recreation Councils

FROM: Scott Reese, Assistant Director, Park and Recreation Department

By: Jim Winter, Project Officer II

SUBJECT: Synthetic Turf Use Guidelines Report

SUMMARY

There is an ever increasing public demand for athletic fields within the City of San Diego (City) most recently associated with community growth and expansion of youth and women's sports programs. At the same time the City is in a drought alert and long-term water shortages are being predicted for Southern California. The use of synthetic turf within the city park system appears to be a viable alternative to natural turf in some circumstances as a means to increase field capacity and improve the consistency of playing conditions while reducing day to day operating costs and conserving important water resources. There are advantages and disadvantages related to synthetic turf use and therefore, the Park and Recreation Department is proposing guidelines to address the use of synthetic turf on athletic fields within the City's park system.

While the City has not conducted independent health or environmental analysis or tests of synthetic turf systems, there is a significant body of research conducted by other governmental agencies, universities and independent laboratories from which to draw. This information was reviewed in the drafting the proposed guidelines. Most current research on newer generations of synthetic turf concludes there is little to no health or environmental risks associated with synthetic turf. It is important for the City to continue to review research and monitor the use of synthetic turf in order to identify future risks to public health or the environment.

The suggested guidelines will provide recommendations to City staff on the design, construction, maintenance and replacement of synthetic turf systems to be installed within any public park, joint use facility or leasehold under the direct control of the Park and Recreation Department.

BACKGROUND:

Synthetic turf, as used in these guidelines, is commonly referred to as crumb rubber infill type system in which crumb rubber granules are added to a flexible synthetic grass carpet to hold the carpet in place, stand the synthetic blades in place and provide a cushioned playing surface. Silica sand may also be mixed with the crumb rubber. The synthetic grass and infill are underlain with a crushed stone base and drainage pipes to facilitate rapid drainage of the playing surface. Several manufacturers provide this type of infill synthetic turf product for use on athletic fields.

Alternative infill materials are being developed which are described by their manufactures to be more environmentally sensitive because the products can be recycled or reused and more user friendly. These infill materials may be organic in nature, such as coconut fiber and cork or inorganic such as resin coated silica sand. The newer infill materials show promise in addressing some of the primary concerns associated with crumb rubber infill so it will be important for the Park and Recreation Department to continue to evaluate these new infill materials as they are developed and tested.

The use of synthetic turf systems on athletic fields has grown in popularity for all levels of play, including public recreational leagues, high school and college athletics, non-profit organizations and professional sports teams. According to estimates prepared by the Synthetic Turf Council, there are approximately 8,000 synthetic turf fields in use in the United States with a projected increase of 800 fields by the end of 2009.¹ The San Diego Unified School District continues to convert existing natural turf high school football fields to multi-use synthetic turf fields as funds become available.

The advantages of synthetic turf over natural turf include:

- Provides a more consistent, resilient and level playing surface
- Does not require irrigation, thus saving potable water
- Does not require the application of fertilizers, pesticides or herbicides thus meeting State School Safety mandates, reducing operating costs and exposure to non-organic compounds.
- Does not require weekly or bi-weekly mowing and edging, thus reducing emissions due to the use of gasoline powered maintenance equipment and reducing operating costs
- Provides year-round use with no down time due to turf renovations or weather related conditions
- Can support heavier use, allowing for additional programming of field use
- Provides an attractive well manicured appearance

The disadvantages to using synthetic turf in a public park may include, but are not limited to:

- Higher initial installation cost
- Increases the cost of repairs related to vandalism or misuse compared to similar repairs made to natural turf
- Requires purchase of specialized maintenance equipment.
- Increases the need for passive security measures and oversight to mitigate improper uses, such as food products, punctures or burns to the carpet, which may reduce manufacturer's warranty or shorten the life span of the product.
- High replacement cost at the end of the synthetic turf's life expectancy for which funding will need to be identified
- Heat build-up on the playing surface can become a health and performance issue for users
- Cost and method of recycling or disposing of synthetic turf components at the end of its lifecycle is not fully known.

The City currently maintains 4.9 acres of synthetic turf located at Pershing Middle School within the community of San Carlos which was opened in September 2006. This is a joint use site with the San Diego Unified School District. This site has no irrigation system and is open to public use when school is not in session.

The field at Pershing Middle School is mostly used by the Crusaders Soccer Club after school hours. The field has been vandalized twice by fire and cost the Department approximately \$10,000 to repair. The repair costs included travel and accommodations for the manufacturer representatives to make the repairs. Any repairs done by a local contractor would have voided the turf system's warrantee.

The Tecolote Youth Baseball organization has installed synthetic turf on three infields at Tecolote Community Park where they are the single permitted users. These infields were installed between 2006 and 2008 with most funding coming from grants the organization received. The organization is also responsible for all maintenance related to these infields.

The synthetic turf joint use field located at Edison Elementary School is within the community of Normal Heights is 1.25 acres in size. This field is maintained by San Diego Unified School District. It was opened in September 2007 and has had no significant maintenance issues to date.

There is a future 1.5 acre joint use proposal with the San Diego Unified School District at the Language Academy located in the Rolando community. This joint use facility is proposed to have a 1.3 acre synthetic turf field which will be maintained by the City. It is anticipated the Language Academy joint use site will be open for public use sometime in 2014.

DISCUSSION

Staff conducted internet research and telephone interviews as background to collect the information necessary to prepare the proposed synthetic turf use guidelines. The internet was used primarily to research health and safety issues and to identify agencies with completed installations. Several cities and counties in southern California were contacted to gain insight from first-hand experience with synthetic turf. Agencies were asked about operational concerns and whether they had a policy or guidelines in place regarding the use of synthetic turf. Following is a brief summary of those interviews:

<u>Agency</u>	<u>Currently have syn. turf fields?</u>	<u>Policy in place?</u>	<u>Restrictions on use?</u>
City of Escondido	indoor only	no	Permit required
City of Oceanside	indoor only	no	Permit required
City of Carlsbad	Five outdoor	no	Permitted, but open to public when not used by permittee
City of Los Angeles	16 outdoor	no	Fields fenced / use by permit only
City of Anaheim	one in design	no	Permit will be required
County of San Diego	Three fields	no	Currently operated and maintained by Little League.
City of Pomona	Four soccer fields	no	Permit required, closed when not in use by permittees
City of San Francisco	12 multi-purpose	yes	Permit required

Our internet research found the City of Seattle is in the process of developing a broad policy on the use of synthetic turf within their park system and is currently in the public input phase. In 2008, San Francisco Recreation and Park Commission established the Synthetic Playfields Task Force to review and discuss existing scientific research on synthetic turf. The task force, in conjunction with the San Francisco Recreation and Park Department staff, developed recommendations to improve the implementation of synthetic turf fields within their park system.² San Francisco has installed 12 synthetic fields since 2007.

Costs and Funding

The initial installation cost of a recreational synthetic turf field is approximately 56% higher than the installation of a similar, well designed natural turf field. Additional project funding will have to be identified to accommodate the installation of synthetic turf athletic fields as an alternative to natural turf field. As a synthetic turf field nears the end of its normal lifecycle, assumed to be 10 years with proper maintenance, a funding source will need to be identified for the replacement of the synthetic turf carpet and supplementing of infill material, estimated to be 60% to 65% of the original installation cost. It is anticipated only minor repairs to the underlying drainage system will be needed at the time of replacement. The future replacement costs will be an

important consideration before proceeding with the development of synthetic turf fields. Most manufactures provide an eight-year warranty on the synthetic turf product, if properly maintained. For the purposes of the proposed guidelines, it shall be assumed the life expectancy of the synthetic turf carpet will be no longer than 10 years.

In addition to identifying funding for the ultimate replacement of the synthetic turf carpet and infill, operational funds need to be budgeted annually to address ordinary maintenance, vandalism, misuse damage and the annual refurbishment of the infill material of the synthetic turf system. These costs are anticipated to be lower than the costs associated with the maintenance, repair and renovation of a natural turf field. Natural turf fields require regular watering, fertilizing, mowing, edging and other chemical treatments to keep them in a playable condition which are not needed for a synthetic turf field. If vandalism is extensive, it is anticipated the cost to repair synthetic turf will be higher than the similar vandalism on a natural turf field. It will be important for the project specifications to include language requiring selected vendors have local or regional representation so repairs can be made in a timely manner and maintenance procedures are reviewed to protect the manufacturer's warranty.

Synthetic turf systems need specialized maintenance equipment to properly manage and maintain the synthetic carpet and infill materials. As new synthetic turf fields are projected to come on line, the annual operational budget should include funding to purchase the necessary maintenance equipment until sufficient equipment has been obtained to properly maintain the synthetic turf fields.

A notable advantage of synthetic turf is its ability to sustain a higher level of programmed use than natural turf. A cost benefit analysis can determine if this higher level of use justifies the higher initial installation costs over the 10-year projected life cycle of the synthetic turf. Since it is anticipated the synthetic turf surface and infill material will need to be replaced at the end of the 10-year life cycle, a cost benefit analysis extending for a 20 year period is also important. There are many variables which can affect the use of any athletic field, such as the popularity of programmed athletics in a community, the local weather patterns and the maintenance resources available.

A cost benefit analysis includes assumptions on athletic field usage, maintenance practices, field renovations and field closures due to weather conditions and field management. Athletic field programming assumptions such as field lighting, youth vs. adult sports and the anticipated number of users for each athletic activity also play an important role in evaluating costs and benefits of an athletic facility. Appendix A, Cost Benefit Analysis, identifies these assumptions in detail.

Based on the Park and Recreation Department's current natural turf management practices and the projected costs associated with synthetic turf fields, it has been determined synthetic turf athletic fields are more expensive than natural turf athletic fields in the short-term and long-term. Over a 10-year period, the projected cost per participant hour of use is approximately \$2.60 for natural turf and \$3.60 for synthetic turf. Over a 20-year period, including one replacement of the synthetic turf carpet and infill, the cost per participant hour of use decreases to \$1.70 for natural

turf and \$2.80 for synthetic turf. The decrease is due to the initial installation costs being spread over a longer period of time. Although the cost benefit analysis indicates synthetic turf will be more expensive than natural turf overall, the proposed funding sources for both installation, replacement/renovation and daily maintenance will play a key role in determining which surface to use.

A majority of capital improvement projects are funded by sources other than the City's general fund. Funding sources such as Development Impact Fees (DIF), Facilities Benefit Assessments (FBA), grants and donations are commonly used for the initial installation of capital improvements. The daily maintenance of new facilities, such as an athletic field, is typically funded by the City's general fund. The annual maintenance costs for a synthetic turf athletic field, including water use, is approximately 56% less than the annual maintenance costs for a natural turf field. The annual maintenance savings realized from the use of a synthetic turf field equates to a savings in the City's general fund. The detailed cost/benefit analysis shown in Appendix A indicates the annual maintenance cost for a 2.5 acre natural turf field to be approximately \$49,400. The annual maintenance cost for similar synthetic turf field is approximately \$21,600. Although the synthetic turf field will save approximately \$27,800 per year, the maintenance savings alone will not fully fund the replacement of the synthetic turf at the end of its 10-year life cycle. Therefore, to realize the maintenance savings within the City's general fund, a funding source outside the general fund must be identified for synthetic turf replacement.

Many factors, including recreational needs and long-term funding sources, must be evaluated before a decision on whether to use a synthetic turf system instead of a natural turf system can be made. The decision cannot be based on a simple cost benefit analysis alone.

Water Use

One of the primary advantages of synthetic turf is it does not need to be irrigated as natural turf does. As an example, a multi-purpose field with sidelines measuring 85 yards by 140 yards is approximately 2.5 acres in size. Current city maintenance practices for natural turf athletic fields provide approximately 1.25" of water per week during the active growing period of May through September. A 2.5 acre multi-purpose field requires approximately 84,850 gallons of water per week during these warmer months or 1,697,000 gallons (2,268 HCF) over the growing season, to properly maintain the natural turf. Although some water is needed for proper maintenance of a synthetic turf surface, approximately 80% of this same amount of water would be saved by a synthetic turf field of similar size.

Based upon 2009 irrigation water rates, the cost of irrigating this 2.5 acre natural turf multi-purpose field is approximately \$7,500 during the active growing season of May through September. This cost does not include additional water needed for turf renovations and reseeding nor water required in the other months of the year. The amount of water needed to maintain natural turf from October through April will vary depending on the type of turf and the local weather patterns. In most cases, water use for turf drops off significantly in the winter months in San Diego.

User Health and Safety

Public debate continues over potential environmental and health hazards associated with the use of synthetic turf. While the City has not conducted an independent analysis of synthetic turf systems, nationally and internationally a large body of research has been commissioned by government health agencies, universities, independent laboratories and health and environmental organizations. Current research based upon newer generations of synthetic turf systems concludes there are no known health or environmental risks associated with the use of synthetic turf. The complete review of current research was commissioned by the New York City Department of Health and Mental Hygiene (DOHMH) at the request of the New York City Department of Parks and Recreation.³ This report focused primarily on crumb rubber infill synthetic turf systems.

The DOHMH report reviewed tests by researchers on the chemical composition of crumb rubber and compiled a list of Chemicals of Potential Concern (COPCs) found in some crumb rubber. The report concluded COPCs in crumb rubber were not a health concern for users of synthetic turf fields, unless users were exposed to extremely high concentrations of COPC's through inhalation, ingestion and dermal absorption. "Although each risk assessment was conducted using distinct assumptions and evaluated different concentrations of COCPs in crumb rubber, all had a similar conclusion: exposure to COCPs from the crumb rubber may occur, however the degree of exposure is likely to be too small through ingestion, dermal absorption or inhalation to increase the risk for any health effect."

The DOHMH report also examined current research on heat related illness, physical injuries and bacterial infections associated with synthetic turf systems. Of these, heat stress and dehydration are the primary health concerns. Synthetic turf systems with crumb rubber infill have heat-absorbing properties and can retain elevated surface temperatures on warm, sunny days.⁴ Therefore, it is recommended shade and drinking water be provided in close proximity to the synthetic turf field. It is also important coaches, management staff, field users and parents be educated on the potential for heat-related illnesses, how to recognize symptoms, prevention measures which should be taken and treatment methods should users exhibit symptoms of heat related illness.

The studies reviewed for the DOHMH report concluded there were no major differences in incidence, severity, nature or cause of injuries sustained on natural grass or synthetic turf. It also concluded while abrasions from synthetic turf surfaces do provide a means of access for bacterial infections, infections are more likely to occur from physical contact, sharing of equipment or poor sanitary practices by users. No significant difference in the incidence of infections has been observed between synthetic and natural turf.

In June, 2008, the Centers for Disease Control and Prevention issued a health advisory regarding unsafe levels of lead found in a synthetic turf field located in Newark, New Jersey.⁵ After testing several other synthetic turf fields, it was determined the high concentrations of lead were due to dust created by early generations of synthetic turf made of nylon or a nylon/polyethylene blend of fibers. Testing of those systems made entirely of polyethylene showed very low levels of lead.

In a recent lawsuit settlement between the State of California and the manufacturer of AstroTurf synthetic turf and two other companies, the manufacturers agreed to lower the levels of lead used in the pigments for coloring the synthetic turf to below the California standards.⁶ Other manufacturers of synthetic turf will also be required to meet these lower lead standards in order to sell their products in California. Therefore, concerns of exposure to lead in synthetic turf products sold and used in California appear to have been adequately addressed. The joint use fields at Pershing Middle School and Edison Elementary School were tested for lead content and found to be below State guidelines.

It is worth noting a study by Environment and Human Health, Inc., conducted for the Connecticut Agricultural Experiment Station⁷ concluded crumb rubber does release chemical compounds into the air and ground water and thus constituted a chemical exposure for humans and the environment. Contrary to that study however, the Connecticut Department of Public Health issued a fact sheet in 2007 about synthetic turf and concluded “Based on current evidence, a public health risk appears unlikely. However, there is still uncertainty and additional investigation is warranted.”⁸ Based on conflicting reports and studies, it is clear any synthetic turf system proposed for the City’s park system must be thoroughly evaluated for potential health and environmental risks.

Heat Island Effect

Synthetic turf fields with crumb rubber infill exhibit heat absorbing properties which cause the surface temperatures to be higher than those of natural turf fields. One strategy of lowering the surface temperatures of synthetic turf is to install a specialized watering system to quickly wet the field. These systems have far fewer heads, spaced at far greater distances than a normal irrigation system. These systems are also used for field rinsing to flush dirt, dust, stranded food and possible dog waste stains. Another approach is to install a series of quick coupling valves around the field to which a hose or sprinkler can be attached. The quick coupling valve approach would be much more labor intensive if it was to be used for field cooling with less control on the amount of water used. Therefore, the quick coupling valve system should only be installed for field maintenance, not field cooling.

The effects of field cooling with water are reported to be of limited value, lasting only 20 to 30 minutes before surface temperatures begin to return.⁹ The amount of water used for field cooling would depend on the frequency and duration the field cooling system is employed. It is anticipated the overall water use would still be less than needed for natural turf irrigation. With the limited resources of the Park and Recreation Department, operating an irrigation system to cool the synthetic turf fields in a public park setting would not be reasonable from an operational standpoint. It is recommended the water for cooling be applied shortly before a game begins, thus requiring a staff member to be present to turn on and off the cooling system at the appropriate times. Most synthetic turf manufacturers recommend wetting of the field prior to grooming in order to reduce abrasion of the carpet fibers. Therefore, turf management including a watering system must be considered in the funding, design and construction of any synthetic turf project.

New infill materials are being developed which are reported by their manufacturers to significantly reduce the heat island effect. These infill materials include organics such as coconut fiber and cork which can absorb moisture and release it slowly thus reducing the surface temperatures via evaporation. A new inorganic infill material of resin coated silica sand which is lighter in color is reported to be less prone to absorb energy from the sun. These new infill materials show promise to avoid the heat absorption properties of the current crumb rubber infill systems.

RECOMMENDATIONS

Based on the research completed to date, the City's past experience with the synthetic turf fields at the joint use sites, current Park and Recreation Department resources and projected long-term water shortages for San Diego, the following recommendations are included in the proposed synthetic turf use guidelines:

Field Management Practices

- Continue to review and evaluate literature and new research available regarding materials, installation, maintenance, injuries, health issues and environmental concerns related to the use of synthetic turf.
- Install signage with health and safety guidelines at all synthetic turf fields, including the existing fields at Pershing Middle School and Edison Elementary School. The signs may include advising users how to recognize heat-related illnesses, the proper steps to moderate and treat such illnesses, appropriate hygiene such as hand washing after playing and practicing, and standard first aid for skin wounds to prevent infections.
- Signs shall also be posted to indicate what activities are allowed and not allowed on synthetic turf. These signs shall preclude, items such as food, drinks, chairs, umbrellas, certain types of athletic shoes and athletic equipment and pets which may damage the turf, invalidate the manufacturer's warranty or shorten the product's life expectancy.
- The Park and Recreation Department will conduct, or participate in, field temperature testing to monitor playing surface temperatures and establish possible criteria for field closures due to excessive surface heat.

Field Planning and Design Guidelines

- The Park and Recreation Department will seek feedback from user groups to assist in the evaluation of synthetic turf products, performance and maintenance practices.
- Synthetic turf fields will not be installed in highly flood prone areas due to potential damage to the turf and possible dissemination of synthetic turf materials, such as the infill material, into storm drains or natural drainage courses.
- The following design criteria shall be considered for synthetic turf approved for use at City maintained locations
 - The manufacturer shall have local or regional representation capable of performing repairs and providing timely maintenance advice.

- All components of the synthetic turf system shall meet or exceed relevant federal, state and local health requirements. Manufacturers shall be required to fully disclose ingredients used in the manufacture of the synthetic turf system and provide complete information on all potentially toxic constituents.
- The synthetic turf system shall be a crumb rubber, crumb rubber and silica sand, synthetic or organic infill type with a subterranean drainage system sufficient to allow the playing surface to drain quickly.
- Project specifications shall include the provision/acquisition of equipment and training necessary to properly maintain the synthetic turf system, per the manufacturer's recommendation.
- Provisions will be made to include shade and drinking fountains near the synthetic turf areas. Shade trees shall not be located so close as increase leaf litter which may increase maintenance requirements of the turf or where roots could damage or interfere with the synthetic turf base or drainage system. Where shade and/or drinking fountains cannot be provided due to design or site constraints, efforts shall be taken to encourage users to provide acceptable, portable shade systems and drinking water.
- A water system including quick coupling valves shall be included to assist in the proper maintenance of the synthetic turf system. It is recommended water not be used to cool the field surface at this time due to projected water shortages and limited staff resources.
- Synthetic turf may be considered for smaller areas other than athletic fields where the extensive use causes soil compaction and makes natural turf very difficult to grow, such as adjacent to playgrounds, within dog off-leash areas or other high use passive areas. These types of synthetic turf installations will be required to adhere to the recommendations above, though some recommendations may be modified or waived to fit a particular situation. In these smaller areas, synthetic turf systems which do not use an infill and are not designed for athletic play may be considered.

Lifecycle Financial Guidelines

- While synthetic turf systems are durable enough to allow extensive athletic recreational activities, they do have a finite life span and are a significant capital investment to install and replace. Therefore, policies need to be in place to ensure the capital investment can be maximized by making every effort to extend the life expectancy of the synthetic turf system.
- The Department should identify a funding source to address vandalism and misuse repairs. These funding sources could include, but not be limited to, an allocation within the Park and Recreation Department's departmental budget or fees collected from permitted users of the synthetic turf fields.
- A funding source for annual refurbishment of the infill material. These funding sources could be similar to those mentioned for vandalism and misuse repair.
- A funding source for the replacement of the synthetic turf system components reaching the end of its life expectancy, including recycling of removed synthetic turf and infill. For the purpose of these guidelines, the life expectancy is assumed to be 10 years.

Field Management Guidelines

- A synthetic turf athletic field installed within a public park is to be used by permit only for sports-related activities. This will require controlled access be established for synthetic turf athletic fields and the fields can be secured when not in use. These athletic fields would not be open to the general public when they are not being used by permitted users unless being supervised by Department personnel. This recommendation would not apply to joint use facilities as discussed below.

It should be noted these proposed guidelines on the use of synthetic turf in City parks may have the net effect of reducing the amount of time available for casual public use of fields converted from natural to synthetic turf. Although the Park and Recreation Department does issue permits for most of its athletic fields, those fields are available for anyone to use when not being used by a permitted activity. Some athletic fields become impromptu off-leash areas for dogs, are used for informal play such as pickup games, kite flying and a variety of other recreational activities. With so many communities within the City being deficient in population based parks, 44 out of the 52 community planning areas¹⁰, it may be difficult to justify the expense of developing a park which can only be used for permitted activities.

The City of Los Angeles is currently fencing and controlling access to their synthetic turf fields to provide the City with better oversight. They believe this will help extend the longevity of the fields. The City of Carlsbad takes a different approach. Carlsbad does issue permits for the use of their synthetic turf fields, but allows them to be open to the public when not occupied by permitted users. Carlsbad has had some vandalism problems and occasionally have had issues with food (mostly sunflower seeds) or sports drinks being left on the field, but generally do not consider those issues to be significant enough to close the fields to non-permitted users.

None of the Cities or Counties interviewed which currently maintain synthetic turf athletic fields within their park system have programs for future funding for replacement; though all recognize it will be a major expense.

Due to the varying recreation facilities found in the City's park system, the Park and Recreation Department Director may waive some or all of the guidelines and/or make additional recommendations when acceptable alternatives have been identified and approved by the Director.

JOINT USE FACILITIES:

Joint use facilities are those where the City has a long-term agreement with another governmental or not-for-profit agency, commonly a local school district, in which the City and the agency share the development costs, use and maintenance of the facility. In a typical joint use facility with a school district, the district is allowed use during regular school hours and the public has access to the facility during non-school hours, weekends and school district holidays. Joint use agreements are specific to each site and are negotiated based on each entity's needs.

Joint use sites are one method the City employs to meet the population-based park requirements as identified in the City's General Plan.

The City currently has 85 joint use agreements with various school districts. Seventy-three (73) of these agreements are with the San Diego Unified School District (SDUSD) and the majority are for playfields. In an October 2002 Memorandum of Understanding (MOU) with SDUSD, it states synthetic turf shall be considered for joint use turf projects of two acres or less. This was included in the MOU because experience has shown joint use natural turf fields under two acres require a higher level of maintenance to keep them in a safe and playable condition.

Joint use turf fields receive a tremendous amount of use. They are used for physical education and recess during the school day and then open for public use when school is not in session, including weekends and school holidays. The concentrated use on smaller natural turf fields causes the turf to wear out quickly, thus requiring frequent renovations where the field will be closed to the school children and the public for a period of time, usually about two to three months. These closures can have a significant impact on the programs of the City, the agency and on the public's use for informal recreational activities. In addition, irrigation water restrictions may severely limit the City's or the agency's ability to perform natural turf renovations.

Therefore, the City and SDUSD agreed in the MOU to consider the use of synthetic turf for the smaller joint use fields. Currently, the City will only consider synthetic turf for joint use fields of one and half (1.5) acres or less.

While joint use sites may be permitted for athletic use by the City, they are generally open to the public during the hours specified in the joint use agreement and are commonly used for a variety of activities, including informal active and passive recreation. Controlled access to a joint use site via a permit process, as described previously for athletic synthetic turf fields in park settings, would be contrary to the intent of providing population-based park space. All other recommendations made previously would still apply to joint use sites.

LEASEHOLDS

The City has lease agreements with various youth sports organizations in which the organization develops City-owned land to provide community recreational opportunities. It is typical for the organization to provide all necessary maintenance for the facilities on the leasehold and to control the programming and use of those facilities. Should an existing leaseholder desire to install a synthetic turf field, they shall meet all the recommendations stated previously and shall amend their lease agreement to include language addressing the maintenance, repair and removal or replacement of the synthetic turf field. New leaseholders shall also be required to meet these recommendations. In all cases, the leaseholder shall demonstrate to the City they are financially capable of meeting the guidelines for the use of synthetic turf in City parks.

Attachments:

Appendix A - Cost Benefit Analysis

References Cited

¹ Synthetic Turf Sports Fields and the Environment, John Amato, P..E. Synthetic Turf Council (STC) Certified Independent Consultant, 2007. <http://www.syntheticurfCouncil.org/displaycommon.cfm?an=1&subarticlenbr=91>

² San Francisco Recreation and Park Department, Synthetic Playfields Task force Findings and Department Recommendations, Report to San Francisco Recreation and Park Commission, http://www.parks.sfgov.org/wcm_recpark/SPTF/SyntheticPlayfieldsReportFinalDraft082108.pdf

³ A Review of the Potential Health and Safety Risks from Synthetic Turf Fields Containing Crumb Rubber Infill, New York City Department of Health and Mental Hygiene, May 2008. http://www.nyc.gov/html/doh/downloads/pdf/eode/turf_report_05-08.pdf

⁴ Penn State Department of Crop and Soil Sciences, Evaluation of Playing Surface Characteristics of Various Infilled Systems. Temperature and Color. <http://www.cropsoil.psu.edu/mcnitt/infill.cfm>

⁵ Centers for Disease Control and Prevention Health Advisory, Potential Exposure to Lead in Artificial Turf: Public Health Issues, Actions, and Recommendations, June 18, 2008

⁶ Brown Creates Nation's First Enforceable Lead Standards for Artificial Turf, Office of the Attorney General, State of California, August 14, 2009. <http://www.ag.ca.gov/newsalerts/release.php?id=1782>

⁷ Environment and Human Health, Inc., Artificial Turf, Copyright 2007, http://www.ehhi.org/reports/turf/turf_report07.pdf

⁸ Connecticut Department of Public Health, Fact Sheet, October 2007, Artificial Turf Fields: Health Questions, <http://www.tahd.org/pdf/artificial%20Turf.pdf>

⁹ Pennsylvania State University, A.S. McNitt, D.M. Petrunak and T.J. Serensits, Temperature Amelioration of Synthetic Turf Surfaces through Irrigation, <http://www.cropsoil.psu.edu/mcnitt/infill.cfm>

¹⁰ City of San Diego, City Planning and Community Investment Department, Current Population-Based Park Requirements per Community Planning Area, August 2009.

Appendix A

Cost Benefit Analysis

This cost benefit analysis was prepared to understand the best use of natural or synthetic turf in park and joint use applications. In reviewing the cost benefit analysis you will find the actual dollar cost for construction and maintenance over both a ten year and a twenty year period is less for natural turf than for synthetic turf. This may be unique to our climate, construction, maintenance and programming practices and may not apply to other climates or organizations.

The benefits of synthetic turf in specific applications can outweigh the use of natural turf when certain conditions apply as for example:

- When a site involves intense expanded use throughout the day as with joint use sites where daily use includes school use.
- In sports complexes where there is a high level of competitive play and playing surfaces must be maintained in a consistent high condition.
- In areas where there are high park deficiencies resulting in more extreme levels of use for play or practice.
- Where it is important to reduce water and or chemical use.
- Where a consistently high appearance environment is needed.
- Where park or facilities deficiencies in an area on a site make it difficult to periodically close a field or area for the purpose of renovating or re-establishing a natural turf.
- As a strategy to reduce operating costs.

The following assumptions have been made regarding the typical use of a 2.5 acre multi-purpose field within the city of San Diego.

Annual Use Assumptions:

1. Natural turf will be rested and renovated during the course of the year of programmed use. Using 4 seasons per year with 2 weeks between the winter, spring and fall seasons for field resting and 7 weeks between the fall and winter seasons for field resting and/or renovation, a natural turf field would be available for programmed use 39 weeks per year.
2. Synthetic turf field will not need to be rested and will only be closed 2 days per year for annual replenishment of the infill material.
3. San Diego averages 40 days of rain per year per the National Oceanic and Atmosphere Administration (NOAA).
 - a. Natural turf fields are closed the day of the rain event and 1 day after the event which equals 80 days of field closure per year or 11.4 weeks.

- b. Synthetic turf fields will be closed the day of the rain event equaling 5.7 weeks per year of field closure. While it is not necessary to close a synthetic turf field during a rain event, it is assumed the recreational leagues will choose not to play in the rain.

Based on these annual use assumptions:

A natural turf field will be programmable 27.6 weeks per year.

A synthetic turf field will be programmable 46 weeks per year.

Annual Field Programming Assumptions:

1. The multi-purpose field has sports lighting allowing nighttime use.
2. The multi-purpose field is programmed from 3 p.m. until 10 p.m. Monday – Friday allowing for 35 hours of programmed use per week.
 - a. Youth sports from 3 p.m. to 6 p.m. = 15 hours per week
 - b. Adult sports from 6 p.m. to 10 p.m. = 20 hours per week
3. The multi-purpose field is programmed from 8 a.m. until 10 p.m. Saturday and Sunday allowing for 28 hours of programmed use per week.
 - a. Youth sports from 8 a.m. to 6 p.m. = 20 hours per week
 - b. Adult sports from 6 p.m. to 10 p.m. = 8 hours per week

These programmable hours equal 63 hours of programmed use per week.

4. The multi-purpose field will be used by 45 participants (three teams) for each hour of use for youth sports practice. (45×15 hours = 675 participant hours per week.)
5. The multi-purpose field will be used by 30 participants (two teams) for each hour of use for youth sports games. (30×20 hours = 600 participant hours per week.)
6. The multi-purpose field will be used by 30 participants (two teams) for each hour of use for adult sports games or practice. (30×28 hours = 840 participant hours per week.)
7. The maximum hours of programmed participant use is 2,115 hours per week.

It is important to note the Annual Field Programming Assumptions above are based on a traditional field programming model. It does not take into consideration non-traditional users such as shift leagues (leagues developed by users which may work at times other than 8 a.m. to 5 p.m.), home school participants or work at home citizens with flexible schedules. While these niche users are currently limited, it is anticipated their numbers will grow in the future which will increase the hours of use of athletic fields.

The following charts are based on the 2.5 acre multi-purpose field used in the water use analysis of the report. This chart does not include the 35 hours per week between 8 a.m. and 3 p.m., Monday through Friday, in which the field may be used for activities other than programmed sports.

Annual Maintenance Requirements

Description	Natural Turf Field	Synthetic Turf Field
Weekly mowing and sweeping	\$10,890	0
Fertilization 3x per year	\$2,160	0
Aeration 3x per year	\$3,375	0
Natural turf renovation (biennial)	\$18,000	0
Routine irrigation inspections/repairs	\$5,200	0
Irrigation water	\$9,750	\$2,100
Weekly synthetic turf sweeping	0	\$8,250
Infill replenishment	0	\$11,250
Total Annual Maintenance Cost	\$49,375	\$21,600

Cost Benefit Chart

10-Year Cost Analysis	Natural Turf Field	Synthetic Turf Field
Initial Installation*	\$1,200,000	\$2,768,000
Annual Maintenance x 10 Years	\$493,750	\$216,000
Total 10-Year Cost	\$1,693,750	\$2,984,000
10-Year Projected Hours of Use	19,231	24,380
10-Year Participant Hours of Use	658,586	834,900
Cost per Hour of Field Use	\$88	\$122
Cost per Participant Hour of Use	\$2.57	\$3.57

20-Year Cost Analysis	Natural Turf Field	Synthetic Turf Field
Initial Installation*	\$1,200,000	\$2,768,000
Annual Maintenance x 20 Years	\$987,500	\$432,000
Synthetic Turf Surface Replacement	0	\$1,522,400
Total 20-Year Cost	\$2,187,500	\$4,722,400
20-Year Projected Hours of Use	38,463	48,760
20-Year Participant Hours of Use	1,317,171	1,669,800
Cost per Hour of Use	\$57	\$97
Cost per Participant Hour of Use	\$1.66	\$2.83

* Initial installation estimate is total project cost, including design, environmental review, permits and fees, construction and City construction administration.